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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

SODERQUIST, ARLEN

ART UNIT	PAPER NUMBER
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1743

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DATE MAILED: 04/15/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/513,207

Applicant(s)

LI ET AL.

Examiner

Arlen Soderquist

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-- Th MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 February 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

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1. Claims 11-15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 11-15 are incomplete, omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationships are those between the ultraviolet spectrometer and the device capable of providing ultraviolet absorption data.

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-2, 4-7, 11-13 and 16-17 are rejected under 35 U.S.C. 102(b) as being anticipated by Danielsson. In the paper Danielsson discusses UV-Vis spectroscopic measurements in opaque solutions: process liquors in the paper and pulp industries. Initial attempts at using an attenuated total reflection probe for measurements in process liquors of the kraft pulp and paper industries are discussed. In white liquor, sulfides and polysulfides were the only species giving appreciable absorption. The probe could be used for sulfide concentrations 1 M. The range of applicability was influenced by the total solute concentration through its effect on the refractive index of the solution. The absorption was related to concentration in a non-traditional way, but this was largely overcome by the use of multivariate calibration methods. The black liquor resulting from the cook contained large amounts of highly absorbing organic compounds, especially lignin. Using synthetic solutions, a successful calibration model for sulfides, lignin, and total solute content was constructed. Before long-time use of the probe in highly alkaline media can be recommended, a protection for the end mirror must be included. Relative to the wavelength capabilities the spectra of figure 5 have a range which goes from 190 nm – 380 nm, covering the claimed range.

4. Claims 1, 4, 6 and 11 are rejected under 35 U.S.C. 102(b) as being anticipated by Bysouth. In the patent Bysouth teaches flow-injection gradient dilution for obtaining

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UV spectra of concentrated solutions. The invention relates to methods and apparatus for precise dilution of concentrated samples enabling their spectra to be obtained. The spectra thus obtained may then be used for calculation of the aromatic hydrocarbon content in the concentrated samples. This invention comprises an arrangement of computer-controlled pumps, an injection valve, a mixing chamber, a flow cell (these components are known as the manifold) and a scanning spectrophotometer (190-375 nm, column 5 lines 29-32), with a sophisticated computational software program. The arrangement generates a reproducible, well-defined gradient from a concentrated sample which is continuously scanned and, using the computational software, allows the spectrum of the sample to be derived, even where the majority of the spectrum for the undiluted sample has an absorbance greater than the upper measurable limit of the spectrophotometer. The invention requires no calibration/characterization for single species measurement since multi-parameters (absorbance at many wavelengths) are monitored or conversely, can be used to obtain spectra of highly concentrated samples and therefore determine multiple species through the use of computer programs.

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. Claims 3, 14-15 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Danielsson as applied to claims 1, 11 and 16 above, and further in

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view of Doyle. Danielsson does not teach using an ATR tunnel flow cell in the method or device.

In the paper Doyle discusses the analysis of strongly absorbing chromophores by UV/visible ATR spectroscopy. This article illustrates the potential of the attenuated total reflectance (ATR) sampling technique for UV/visible analysis and explores ways in which this potential can be maximized. Although UV/visible ATR is far from new, it was largely neglected, perhaps because of the limited range of operating conditions used in previous work. By the appropriate choice of ATR optical design and operating parameters the authors were able to maximize the sensitivity of the technique for diverse sample conditions. The design they developed was a tunnel flow cell shown in figure 4. The advantages of this system is that it eliminates the restriction of angle of incidence which allows the use of materials such as fused silica (page 50). The device of figure 4 also does not need a mirror to function. Figure 8 shows spectra accumulated over the claimed region for the silica ATR element. The authors also observed artifacts at high concentrations of some analytes, which are a result of refractive index dispersion resulting from strong electronic transitions in the vacuum UV region. Of particular interest is the potential for using small amounts of solvent to shift the frequencies of these artifacts so as to optimize the analysis of minor constituents.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the ATR element configuration of Danielsson with the tunnel flow cell configuration of Doyle because of its advantages taught by Doyle such as optimizing the system for maximum sensitivity and elimination of a restriction on the angle of incidence or for a recognition that the mirror problem of Danielsson would not be present in the tunnel flow cell configuration.

7. Claims 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Danielsson as applied to claim 7 above, and further in view of Holmqvist (US 5,582,684) and Salomon. Danielsson does not teach the measurement of sodium hydroxide or sodium carbonate.

In the patent Holmqvist teaches a method of determining the degree of reduction in a sulfate liquor or smelt solution using a combination of UV and IR spectroscopy.

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The title method is based on the measurement of light absorption of the sulfide in UV-range between 200-250 nm which differs from that of sulfate, thiosulfate, sulfite and carbonate which can be measured in the IR range. The method does not require a chemical reaction step such as that of common colorimetry method.

In the paper Salomon discusses ion monitoring of kraft process liquors by capillary electrophoresis. Chemical recovery and liquor regeneration efficiencies in kraft pulping are evaluated by monitoring these ions: chloride, thiosulfate, sulfite, sulfate, sulfide, hydroxide, carbonate, Na^+ , and K^+ . Capillary zone electrophoresis (CZE) is an analytical technique that optimizes the separation of charged species. The technique is used to determine the important inorganic and organic ions in kraft process streams by UV detection at 254 and 214 nm. The determinations correlate with the kraft process variables, e.g. sulfidity in the white liquor, reduction efficiency of the recovery furnace, and causticization efficiency in the slaker operation (Table 1). For ease of data processing sulfur speciation is best performed at 185 nm. Results obtained by off-line monitoring of ions found in the white, black, and green liquors from kraft mills are presented. Figure 1 shows a kraft process flow diagram. Figure 2 presents the electropherogram with the detector set at 214 nm and shows that hydroxide, sulfide (hydrosulfide), and carbonate all absorb at this wavelength. Figure 3 presents an electropherogram with the detector set at 254 nm and shows that only hydroxide and carbonate absorb at this wavelength. Figures 4, 6 and 7 show electropherograms of samples of black liquor, green liquor and white liquor respectively.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to include carbonate and hydroxide into the determination of Danielsson because as shown by Salomon they are inorganic ions that are important in the solution which make up the kraft process and because one of skill in the art would have recognized that due to the difference in absorption behavior at the wavelengths taught by Salomon the it would be possible to determine the carbonate and hydroxide.

8. Applicant's arguments filed February 20, 2002 have been fully considered but they are not persuasive. Applicant is advised that there has never been any indication of allowable subject matter in this application by the examiner. Any such interpretation

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is clearly a misreading of the paragraph warning about duplicate claims. In considering whether or not duplicate claims are present, examiner realized that the apparatus of claims 11-15 lack the cooperative structural relationships required to produce definite claims. One comment of warning is that if the cooperative structural relationship is formed through an optical fiber, there are duplicate claims in the application.

With respect to the art rejections two things need to be established: apparatus are treated different from methods and arguments should be commensurate with the scope of the claims. With respect to the first point an apparatus may still anticipated by a reference even though it has no disclosure of using the apparatus for the intended purpose or a claimed method directed at the intended purpose.

Relative to the Danielsson reference and the wavelength capabilities of the apparatus, the spectra of figure 5 have a range of 190 nm – 380 nm, covering the claimed range. The Doyle reference shows that the fused silica is capable of transmitting UV light over the required range while the newly cited patent references show that a Deuterium lamp is capable of producing light over the required range. The fact that the spectra shown do not cover the whole range does not mean that an absorption spectra is not obtainable over the whole range. Although applicant has argued that Danielsson is incapable of providing absorption below 210 nm, there is no probative evidence to support the argument. The remaining arguments directed at the anticipation of Danielsson are not commensurate in scope with the claims since there is no requirement that all three components/compounds be measured in the respective claims. Thus Danielsson does anticipate claims 1-2, 4-7, 11-13 and 16-17. In a similar manner the Bysouth reference anticipates claims 1, 4, 6 and 11 because the claims fail to limit the method or device to one that does not include dilution.

Arguments directed to the combination of Doyle with Danielsson are not persuasive for the reasons given above. Relative to the combination of Danielsson with Salomon and Holmqvist applicant is directed to the fact that the claims fail to specify wavelengths that are used for each of the components. Thus any wavelengths within the claimed range are possible for use in the detection of the components. With this in mind, it is clear that Salomon shows the response of all three required components to

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wavelengths within the claimed wavelength range. From this it would have been obvious to develop a program that measured components having a signal response within the required wavelength range. Relative to the Holmqvist reference it clearly shows that kraft or pulp processing liquids/liquors have absorptions in the desired range and there is a desire to measure the concentration of the compounds found therein. Thus one of skill in the art would have found it obvious to use the method of Danielsson for that purpose.

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The additional art relates to UV spectroscopy and/or determination of the claimed ions in kraft or other liquid solutions.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arlen Soderquist whose telephone number is (703) 308-3989. The examiner's schedule is variable between the hours of about 5:30 AM to about 5:00 PM on Monday through Thursday and alternate Fridays.

For communication by fax to the organization where this application or proceeding is assigned, (703) 305-7719 may be used for official, unofficial or draft papers. When using this number a call to alert the examiner would be appreciated. Numbers for faxing official papers are 703-872-9310 (before finals), 703-872-9311 (after-final), 703-305-7718, 703-305-5408 and 703-305-5433. The above fax numbers will generally allow the papers to be forwarded to the examiner in a timely manner.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.



4/11/02

ARLEN SODERQUIST
PRIMARY EXAMINER